WHAT IS CLAIMED IS:

1. A method of mapping a set of *n*-dimensional input patterns to an *m*-dimensional space using locally defined neural networks, comprising the steps of:

(a) creating a set of locally defined neural networks trained according to a mapping of a subset of the *n*-dimensional input patterns into an *m*-dimensional output space;

(b) mapping additional *n*-dimensional input patterns using the locally defined neural networks.

2. The method of claim 1, wherein step (a) comprises the steps of:

(i) selecting k patterns from the set of input patterns, $\{\mathbf{x}_i, i = 1, 2, ... k, \mathbf{x}_i \in R^n\}$;

(ii) mapping the patterns $\{\mathbf{x}_i\}$ into an *m*-dimensional space ($\mathbf{x}_i \rightarrow \mathbf{y}_i, i = 1, 2, ... k, \mathbf{y}_i \in R^m$), to form a training set $T = \{(\mathbf{x}_i, \mathbf{y}_i), i = 1, 2, ... k\}$;

(iii) determining c *n*-dimensional reference points, $\{\mathbf{c}_i, i = 1, 2, ... c, \mathbf{c}_i \in R^n\}$;

(iv) partitioning T into c disjoint clusters C_j based on a distance function d, $\{C_j = \{(\mathbf{x}_i, \mathbf{y}_i): d(\mathbf{x}_i, \mathbf{c}_j) \leq d(\mathbf{x}_i, \mathbf{c}_k)$ for all $k \neq j; j = 1, 2, ... c; i = 1, 2, ... k\}$; and

(v) training c independent local networks $\{Net_i^L, i = 1, 2, ... c\}$, with the respective pattern subsets C_i.

3. The method of claim 2, wherein said step (iii) is performed using a clustering methodology.

4. The method of claim 2, wherein said step (b) comprises the steps of:

(i) for an additional n-dimensional input pattern $\mathbf{x} \in R^n$, determining the distance to each reference point in $\{\mathbf{c}_i\}$;

(ii) identifying the reference point $\mathbf{c}_j$ closest to the input pattern $\mathbf{x}$; and

(iii) mapping $\mathbf{x} \rightarrow \mathbf{y}$, $\mathbf{y} \in R^m$, using the local neural network Net_j^L associated with the reference point $\mathbf{c}_j$ identified in step (ii).

5. The method of claim 1, wherein step (a) comprises the steps of:

(i) selecting k patterns of the set of n-dimensional input patterns, $\{\mathbf{x}_i, i = 1, 2, ... k, \mathbf{x}_i \in R^n\}$;

(ii) mapping the patterns $\{\mathbf{x}_i\}$ into an m-dimensional space ($\mathbf{x}_i \rightarrow \mathbf{y}_i$, $i = 1, 2, ... k$, $\mathbf{y}_i \in R^m$), to form a training set $T = \{(\mathbf{x}_i, \mathbf{y}_i), i = 1, 2, ... k\}$;

(iii) determining c m-dimensional reference points, $\{\mathbf{c}_i, i = 1, 2, ... c, \mathbf{c}_i \in R^m\}$;

(iv) partitioning T into c disjoint clusters C_j based on a distance function d, $\{C_j = \{(\mathbf{x}_i, \mathbf{y}_i): d(\mathbf{y}_i, \mathbf{c}_j) \leq d(\mathbf{y}_i, \mathbf{c}_k)$ for all $k \neq j$; $j = 1, 2, ... c$; $i = 1, 2, ... k\}\}$;

(v) training c independent local networks $\{Net_i^L, i = 1, 2, ... c\}$, with the respective pattern subsets C_i; and

(vi) training a global network Net^G using all the patterns in T.

6. The method of claim 5, wherein said step (iii) is performed using a clustering methodology.

7. The method of claim 5, wherein step (b) comprises the steps of:

(i) for an additional n-dimensional pattern $\mathbf{x} \in R^n$, mapping $\mathbf{x} \rightarrow \mathbf{y}'$, $\mathbf{y}' \in R^m$, using Net^G;

(ii) determining the distance of $\mathbf{y}'$ to each reference point in $\{\mathbf{c}_i\}$;

(iii) identifying the reference point $\mathbf{c}_j$ closest to $\mathbf{y}'$,and

(iv) mapping $\mathbf{x} \rightarrow \mathbf{y}$, $\mathbf{y} \in R^m$, using the local neural network Net_j^L associated with the reference point $\mathbf{c}_j$ identified in step (iii).

8. A computer program product comprising a computer usable medium having computer readable program code means embodied in said medium for causing an application program to execute on a computer that maps a set of *n*-dimensional input patterns to an *m*-dimensional space using locally defined neural networks, said computer readable program code means comprising:

a first computer readable program code means for causing the computer to create a set of locally defined neural networks trained according to a mapping of a subset of the *n*-dimensional input patterns into an *m*-dimensional space;

a second computer readable program code means for causing the computer to project additional *n*-dimensional patterns of the input set using the locally defined neural networks.

9. The computer program product of claim 8, wherein said first computer readable code means comprises:

(i) computer readable program code means for selecting *k* patterns from the set of input patterns, $\{\mathbf{x}_i, i = 1, 2, ... k, \mathbf{x}_i \in R^n\}$;

(ii) computer readable program code means for mapping the patterns $\{\mathbf{x}_i\}$ into an *m*-dimensional space ($\mathbf{x}_i \rightarrow \mathbf{y}_i$, i = 1, 2, ... k, $\mathbf{y}_i \in R^m$), to form a training set $T = \{(\mathbf{x}_i, \mathbf{y}_i), i = 1, 2, ... k\}$;

(iii) computer readable program code means for determining c n-dimensional reference points, $\{\mathbf{c}_i, i = 1, 2, ... c, \mathbf{c}_i \in R^n\}$;

(iv) computer readable program code means for partitioning T into c disjoint clusters C_j based on a distance function d, $\{C_j = \{(\mathbf{x}_i, \mathbf{y}_i): d(\mathbf{x}_i, \mathbf{c}_j) \leq d(\mathbf{x}_i, \mathbf{c}_k)$ for all $k \neq j$; $j = 1, 2, ... c$; $i = 1, 2, ... k\}\}$; and

(v) computer readable program code means for training c independent local networks $\{Net_i^L, i = 1, 2, ... c\}$, with the respective pattern subsets C_i.

10. The computer program product of claim 9, wherein said computer readable program code means uses a clustering methodology.

11. The computer program product of claim 9, wherein said second computer readable code means comprises:

(i) for an additional n-dimensional pattern $\mathbf{x} \in R^n$, computer readable program code means for determining the distance to each reference point in $\{\mathbf{c}_i\}$;

(ii) computer readable program code means for identifying the reference point $\mathbf{c}_j$ closest to the input pattern $\mathbf{x}$; and

(iii) computer readable program code means for mapping $\mathbf{x} \rightarrow \mathbf{y}$, $\mathbf{y} \in R^m$, using the local neural network Net_j^L associated with the reference point $\mathbf{c}_j$ identified in step (ii).

12. The computer program product of claim 8, wherein said first computer readable program code means comprises:

(i) computer readable program code means for selecting k patterns of the set of n-dimensional input patterns, $\{\mathbf{x}_i, i = 1, 2, ... k, \mathbf{x}_i \in R^n\}$;

(ii) computer readable program code means for mapping the patterns $\{\mathbf{x}_i\}$ into an m-dimensional space ($\mathbf{x}_i \rightarrow \mathbf{y}_i$, i = 1, 2, ... k), to form a training set $T = \{(\mathbf{x}_i, \mathbf{y}_i), i = 1, 2, ... k\}$;

(iii) computer readable program code means for determining c m-dimensional reference points, $\{\mathbf{c}_i, i = 1, 2, ... c, \mathbf{c}_i \in R^m\}$;

(iv) computer readable program code means for partitioning T into c disjoint clusters C_j based on a distance function d, $\{C_j = \{(\mathbf{x}_i, \mathbf{y}_i): d(\mathbf{y}_i, \mathbf{c}_j) \leq d(\mathbf{y}_i, \mathbf{c}_k)$ for all $k \neq j$; $j = 1, 2, ... c$; $i = 1, 2, ... k\}\}$;

(v) computer readable program code means for training c independent local networks $\{Net_i^L, i = 1, 2, ... c\}$, with the respective pattern subsets C_i; and

(vi) computer readable program code means for training a global network Net^G using all the patterns in T.

13. The computer program product of claim 12, wherein said computer readable program code means uses a clustering methodology.

14. The computer program product of claim 12, wherein said second computer readable program code means comprises:

(i) for an additional n-dimensional pattern $\mathbf{x} \in R^n$, computer readable program code means for mapping $\mathbf{x} \rightarrow \mathbf{y}'$, $\mathbf{y}' \in R^m$, using Net^G;

(ii) computer readable program code means for determining the distance of $\mathbf{y}'$ to each reference point in $\{\mathbf{c}_i\}$;

(iii) computer readable program code means for identifying the reference point $\mathbf{c}_j$ closest to $\mathbf{y}'$,and

(iv) computer readable program code means for mapping $\mathbf{x} \rightarrow \mathbf{y}$, $\mathbf{y} \in R^m$, using the local neural network Net_j^L associated with the reference point $\mathbf{c}_j$ identified in step (iii).